

TURFGRASS, TREE & SHRUB CARE DURING DROUGHT



DENVER WATER

Winter/Spring (2003) Lawn Management for Colorado Lawns

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The current drought, brought on by several years of below-average precipitation in Colorado, will almost certainly dictate continued landscape watering restrictions in 2003. The extent and duration of those restrictions are largely unknown and may vary greatly among cities and water districts. Although there are many unknowns regarding the ability to irrigate lawns and landscapes at this point, some comprehensive spring lawn care recommendations for early 2003 are offered here. These recommendations apply equally to both the commercial lawn care customer and those homeowners who care for their own lawns.

Fertilizing the Lawn

- Fertilization of lawns this spring (March-June) is a highly recommended practice
- The ideal fertilizer will contain a mixture of quickly and slowly available nitrogen sources
 - Most lawn care companies use these type of fertilizer blends
 - Excellent fertilizer blends are available to the homeowner from local nurseries and garden centers
- Fertilizer applied before watering is allowed will not cause a problem for lawns; adequate moisture from spring precipitation and irrigation (once it is allowed) will cause nutrients to be released to the turf

Aerating (Cultivating) the Lawn

- Lawn aeration is still a highly recommended spring lawn care practice
- While deeper (2-3 inches) core holes provide the greatest benefit to the lawn, even shallow (1 inch) core holes will help to enhance water infiltration for the spring and summer watering periods
- Overseeding may be done in conjunction with lawn aeration; this may especially benefit those lawns thinned by last summer's drought conditions (avoid using crabgrass preemergent herbicides at the time of overseeding)
- Lawn aeration will help to control thatch, an organic layer that often impedes proper water movement into the soil
- Lawn aeration, fertilization, and overseeding all can be done at the same time

Mowing the Lawn

- Set your mowing height at 2 ½ to 3 inches and mow at the same height all growing season
- Don't remove more than 3/4 inch of grass at any single mowing; recycle grass clippings into the lawn
- Use a sharp blade to reduce tearing of the grass leaves
- Whenever possible, mow during the cooler morning or evening hours to avoid causing stress to the lawn

Weed Control in the Lawn

- The use of preemergent herbicides for prevention of crabgrass, foxtail, and other annual grassy weed problems is a recommended spring lawn care practice
 - These products should NOT be used on those lawns being overseeded in the spring
 - Any preemergent herbicide should be watered in with at least ½ inch of water as soon as possible after application
- Where a preemergent herbicide is not used in the spring for crabgrass prevention (perhaps when lawns are being overseeded), there are excellent postemergent herbicide products for the control of young annual grassy weeds
 - These products are expensive and not generally available for homeowner use
 - These crabgrass control products work most effectively when applied by lawn care professionals
- Control of dandelion, clover, bindweed and other perennial broadleaf weeds can be done in the spring
 - There are a variety of excellent products available to the homeowner at local garden centers
 - The most effective broadleaf herbicides are those used by professional lawn care companies
 - Spot treatment of individual weeds is the most effective method of controlling broadleaf weeds
 - Broadleaf weeds are most effectively controlled when daytime temperatures are in the 50s to mid 70s and soil moisture is high enough that weeds are not drought-stressed

Watering the Lawn

- Follow watering programs encouraged or mandated in your community
 - Begin irrigating the lawn as soon as it is allowed
 - The less frequent irrigation regimes that most communities will allow in 2003, especially during the spring, may actually enhance turf drought resistance for the summer
 - Where twice-weekly irrigation is allowed, good lawn quality can be expected throughout the spring and early summer
 - Once-weekly irrigation can produce good turf quality for most of the spring, and will be sufficient to allow most lawns to survive even a hot and dry summer
 - Disregard for required community watering practices can result in substantial fines and may encourage communities to enact even stricter watering restrictions
- As soon as irrigation is allowed in the spring, take time to refresh your understanding of how your irrigation system operates
 - Learn how to program your control clock so that you irrigate according to the schedule mandated for your community
 - Set the clock so that irrigation occurs between 6PM and 10 AM (or as otherwise mandated)
 - Repair or replace broken irrigation heads
 - Adjust irrigation heads to avoid throwing water on streets, driveways, and other hardscapes
 - If you find that adjusting or repairing your irrigation system is too time-consuming or challenging, hire an irrigation or landscape management specialist to perform this important work
 - Your lawn care company professional may be willing to program your irrigation control clock for you
 - Contact your local water provider for information on conducting an irrigation audit; some lawn care companies, landscape management firms, or irrigation installation firms will conduct an audit of your irrigation system for a modest fee
- On your watering day, irrigate using the following technique (unless otherwise mandated by local regulations):
 - Apply $\frac{3}{4}$ to 1 inch of water, slowly enough that runoff and puddling do not occur
 - Cycling through irrigation stations or moving your sprinkler around the yard (applying smaller amounts of water) while irrigating helps water to soak more thoroughly and evenly into the lawn; repeat your cycle until the desired amount of water has been applied
 - Hand-watering small or isolated dry spots, where sprinklers don't overlap properly, will save water

Other Lawn Care Practices

- The application of wetting agents specifically developed for use on turf is recommended to reduce the occurrence of water repellent conditions in lawns
 - Wetting agents can benefit lawns subjected to extreme drying over the past few months by promoting better infiltration of water into the soil; spring and summer use may reduce the occurrence and/or severity of dry spots in the lawn (but will NOT totally compensate for poor irrigation coverage)
 - Wetting agents are available in both granular and liquid forms; granular formulations are often easier for homeowners to apply
 - The use of dishwashing detergents and other soaps in place of turf-type wetting agents is not recommended and may damage heat- and drought-stressed lawns
- The incorporation of water-absorbing polymers (sometimes called "hydrogels") into new or existing lawns does NOT reduce lawn water requirements and is not recommended for Colorado lawns
- The application of green colorants to dormant lawns is safe, provided that paints or colorants developed for turf are used; professional application by a lawn care or landscape management company is recommended

Information contained in this fact sheet is intended for use from January 1-June 30, 2003.

Read and abide by all instructions before using any pesticide, fertilizer, or other turf care product. The use of products not labeled for or intended for use on lawns may damage turf, especially when lawns are under heat and drought stress.

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Watering Trees During Drought

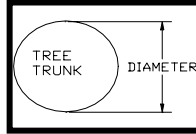


- ❖ **Tree roots are not like carrots.** Tree root systems can spread 2 – 3 times wider than the height of the tree. Most of the tree's absorbing roots are in the top twelve inches of the soil. Water should be applied within the dripline (the critical root zone in the box above).
- ❖ **Water deeply and slowly.** Apply water so it moistens the critical root zone to a depth of twelve inches. Methods for watering include a deep root fork or needle, soaker hose or soft spray wand. Apply water to many locations under dripline. If a deep root fork or needle is used, insert the device no deeper than eight inches into the soil.
- ❖ **How much water should I apply?** As a general survival rule, apply ten gallons of water for each diameter inch of the tree. For example, a two-inch diameter tree will need twenty gallons per watering. Use a ruler to measure your tree's diameter.
- ❖ **When should I water?** Fall and winter watering, October – March, one to two times per month, depending on weather, temperature and soil conditions. Spring and summer watering, April – September, three times per month, depending on weather and watering restrictions.
- ❖ **Mulch helps conserve soil moisture.** Apply organic mulch within the dripline, at a depth of four inches. Leave a six-inch space between the mulch and trunk of trees. Mulch materials may include wood chips, bark, leaves and evergreen needles.
- ❖ **Consistent moisture is needed.** Drought stressed trees are more vulnerable to disease and insect infestations and branch dieback. Keep a watchful eye for anything that looks out of the ordinary.

FALL/WINTER TREE WATERING SCHEDULE (OCTOBER-MARCH)

WATERING TIMES(minutes) ONCE OR TWICE PER MONTH

TEMPERATURE AND WEATHER DEPENDENT (>40 DEGREES, NO SNOW COVER)



TRUNK DIAMETER

DEVICE	<1"	1"	2"	4"	6"	8"	10"	12"	14"+
 DEEP ROOT FORK (2 gpm)	2	5	10	20	30	40	50	60	70+
 DEEP ROOT NEEDLE (2 gpm)	2	5	10	20	30	40	50	60	70+
 SOFT SPRAY WAND (4 gpm)	1	3	5	10	15	20	25	30	35+
 SOAKER HOSE (2 gpm) (50 feet with restrictor)	2	5	10	20	30	40	50	60	70+

CARING FOR TREES DURING DROUGHT

Periods of drought are common on Colorado's Front Range. This area is naturally a semi-arid, shortgrass prairie that would have few trees without irrigation. Growing trees here is difficult in wet years let alone in drought years. Drought makes growing healthy trees in this region all the more challenging and reinforces the value of a majestic shade tree. Properly placed and maintained trees are an asset to the environment and to our community.

To link directly to the question you are interested in, click topic below:

1. **What does a tree under “drought stress” look like?**
2. **Where do I water my tree?**
3. **Tree Watering: Amount of water needed and methods to use.**
4. **Understanding tree roots**
5. **How to preserve tree health when water restrictions are in place?**
6. **How do I prioritize watering needs for different types of trees?**
7. **Do I need to water my tree in the winter?**

1. What does a tree under “drought stress” look like?

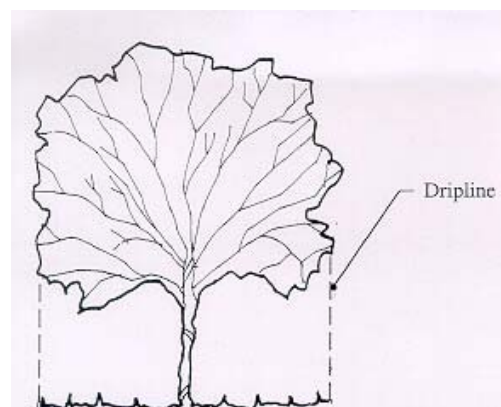
- Symptoms of drought injury to trees can be sudden or may take up to two years to be revealed. Drought injury symptoms on tree leaves include wilting, curling at the edges, and yellowing.
- Deciduous leaves may develop scorch, brown outside edges or browning between veins.
- Evergreen needles may turn yellow, red or purple. They may also turn brown at the tips of the needles and browning may progress through the needle towards the twig.
- In continued drought, leaves may be smaller than normal, drop prematurely or remain attached to the tree even though brown.
- Often times, drought stress may not kill a tree outright, but set it up for more serious secondary insect and disease infestations in following years.

2. Where do I water my tree?

- Deep watering to a depth of 12” inches below the soil surface is recommended.
- Saturate the soil around the tree within the “dripline” (the outer edges of the tree’s branches) to disperse water down toward the roots.
- For evergreens, water 3’-5’ beyond the dripline on all sides of the tree.
- The objective is to water slowly, dispersing the flow of water to get the water deep down to the trees roots.

Watering for short periods of time only

encourages shallow rooting which can lead to more drought damage.



- Don't dig holes in the ground in an effort to water deeply. This dries out roots even more. A soil needle/deep root feeder attached to a hose is acceptable to insert into the ground if your soil is not too hard and compact.
- Overhead spraying of tree leaves is inefficient and should be avoided during drought conditions. Watering at ground level to avoid throwing water in the air is more efficient.

3. Tree Watering: Amount of water needed and methods to use.

During the drought, trees must be given top watering priority over your lawn. However, caring for trees requires different watering methods than your lawn. During water restrictions, irrigation systems designed to water turf do not sufficiently water your trees. During the drought, trees should be given a higher priority than lawns. Lawns can be replaced in a matter of months whereas a 20 year old tree will take 20 years to replace.

- How much water your tree should receive depends upon the tree size. *A general rule of thumb is to use approximately 10 gallons of water per inch of trunk diameter for each watering.* Measure trunk diameter at knee height. *General formula:* Tree Diameter x 5 minutes = Total Watering Time.
- Example: When you hand water using a hose at medium pressure, it will take approximately 5 minutes to produce 10 gallons of water. If you have a 4" diameter tree, it should receive 40 gallons of water - multiply by 5 minutes to equal total watering time of 20 minutes.
- All size trees should be watered April through September according to the guidelines below. All trees should also receive adequate water during the winter months too –For more information on winter watering, see below.
- Water should be distributed evenly under the dripline of the tree.

The best watering method depends upon whether you have a small (1-7" diameter), medium (8-15" diameter) or large sized (16"+ diameter) tree.

- *Small Trees (1-7" diameter)* –3 times per month, April through September.
- Newly planted and smaller trees can get adequate water within the existing watering restrictions by hand watering with a soft spray hose attachment as a separate zone on your designated day.
- ◆ Small trees are best watered using the following methods:
 - Automated drip irrigation system/soaker hose.
 - End of the hose using a soft spray attachment at medium pressure
 - 5-gallon bucket (with 1/4" holes drilled in bottom) or watering bags – filled and set under the dripline.
 - Soil needle (deep root feeder) - Work the needle into the soil at an angle to a depth of 8 inches. Use the needle at low to moderate water pressure. Water the area under the branches in at least twelve sites. Scatter the sites around the area bordered by the drip line. For new trees and those planted within five years, place the needle at least three feet from the trunk. Water a minimum of four sites around young trees.



5-gallon bucket method



Soaker Hose method

- **Medium Trees (8-15" diameter)** -3 times per month, April through September.
- ◆ Medium sized trees are best watered using the following methods:
 - Soaker hose coiled several times under the dripline of the tree.
 - End of the hose with a soft spray attachment to disperse the flow – use a medium pressure.
 - Soil needle (deep root feeder) - Work the needle into the soil at an angle to a depth of 8 inches. Use the needle at low to moderate water pressure. Water the area under the branches in at least twelve sites. Scatter the sites around the area bordered by the drip line. For new trees and those planted within five years, place the needle at least three feet from the trunk. Water a minimum of four sites around young trees.



Hose with Shower attachment



Hose with Soil Needle

- *Large Trees (16"+ diameter)* -3 times per month, April through September.
- ◆ Healthy mature trees should be able to withstand a short-term drought.
- ◆ Large trees are best watered using the following method:
 - End of the hose with a shower like hose attachment to disperse the flow – use a medium pressure.
 - Soil needle (deep root feeder) - Work the needle into the soil at an angle to a depth of 8 inches. Use the needle at low to moderate water pressure. Water the area under the branches in at least twelve sites. Scatter the sites around the area bordered by the drip line. For new trees and those planted within five years, place the needle at least three feet from the trunk. Water a minimum of four sites around young trees.

Additional Watering Tips...

- Reuse the water you save waiting for the shower to warm up.
- If you drain your kids' pools, pour the water under a tree.
- Redirect your rain gutters toward your trees.

4. Understanding tree roots

Most people do not understand what their trees' root system looks like. Tree root systems consist of large perennial roots and smaller, short-lived, adsorbing roots. The large, woody tree roots and their primary branches increase in size and grow horizontally. At least 90% are located in the top 12" inches of the soil. Root functions include water and mineral conduction, food and water storage, and anchorage.

In contrast, adsorbing roots, although averaging only 1/16 inch in diameter, constitute the major portion of the root system's surface area. These smaller roots grow outward and predominantly upward from the large roots near the soil surface, where minerals, water and oxygen are relatively abundant. The major function of adsorbing roots is the absorption of water and minerals.

Large roots and small adsorbing roots occupy a large area under ground. Typically, the root system of a tree extends outward well past the dripline, up to two to four times the height of the tree.



5. Listed below are tree maintenance procedures that can significantly increase a tree's chance of making it through drought periods.

- *Mulch around your trees with 4 inches of organic mulch to reduce moisture loss.*
- ◆ Use wood chips, shredded bark, leaves or evergreen needles as mulch – avoid the use of stone or rock near trees as this increases air temperatures and moisture loss from leaves and stems.
- ◆ Pull back mulch 6" from the trunk of the tree.
- *Do not fertilize a tree that is under drought stress.* Salts in fertilizer may burn roots when there is not sufficient water. Fertilizers may also stimulate top growth resulting in too much leaf area on the plant for the root system to maintain during periods of limited soil moisture.
- *Keep your trees healthy and pest free.* Postpone any construction activities planned near your tree to reduce impact to the trees' roots. If your tree has any insect or disease problem that may be adding additional stress – treat them accordingly to reduce the overall stress to your trees.
- *Properly prune trees and shrubs during time of drought to improve structure, limb stability and to remove dead and weakened branches.* Leaving broken, dead, insect-infested or diseased branches can further weaken a tree during drought and set the tree up for deadly secondary insect and disease problems.
- *Many tree species are harmed by herbicides used in the lawn.* Trees already stressed by drought can be harmed by a heavy application of herbicide in the root zone.



Use mulch to conserve water.

Following these guidelines will help preserve our trees, the most valuable assets to our landscapes, and will also meet guidelines for water conservation during drought periods.

6. How do I prioritize watering needs for different types of tree?

1. The first trees to consider watering are those that will be most vulnerable and affected by dry conditions.
 - Newly planted and young trees (1-7" diameter) are not yet established and have a limited root system. These trees generally need supplemental water even when we are not experiencing drought conditions. Generally it will take one full year per inch of trunk diameter to get established. Ex. It will take 3 years for a 3" caliper tree to establish itself.
 - Trees growing within a restricted root zone. Examples are trees adjacent to a driveway or house, growing within a landscape strip between your sidewalk and the street, growing in a median or traffic circle.
 - Trees that have recently received root injury due to construction work will need supplemental watering because the root system has been compromised.

2. Next to consider are the trees that are generally better equipped to withstand drought conditions.

- In continued dry conditions even older trees will start to show symptoms of drought stress and will need supplemental water although less frequently than younger trees.
- Established drought tolerant species may also need supplemental watering with continued drought.
- Volunteer trees (self-seeded) or “weed” trees typically have extensive root systems and need less water.

7. Do I need to water my tree in the winter?

Even in years when drought is not a concern – winter watering is crucial, especially with evergreen trees! Well-timed fall and winter watering may allow a tree to survive on less water than a regime of plentiful water applications during the growing season. Tree roots continue to grow throughout the winter and need moisture to survive. Generally, water one to two times per month October through March on a warm day when the ground is not frozen. Use the same amount of water as during the summer months.

Planting Trees and Shrubs in Times of Drought and Water Restrictions Recommendations for Responsible Planting and Care

- Planting trees and shrubs during times of drought and water restrictions should continue with caution. An understanding of the risks associated and consideration of proper maintenance activities to establish trees during these periods is crucial.
- Prudently planting trees can replace drought stressed and dead trees, which can help reduce the negative effects of drought on the landscape.
- Keeping trees in the landscape helps reduce soil erosion, stabilizes soils, significantly reduces storm water runoff and shades landscapes and structures to help minimize water and energy use.
- Factors to consider when planting trees and shrubs include soil conditions, available space above and below ground, exposure, moisture and light requirements.
- Planting smaller trees (2 inches or less caliper for deciduous trees and 6 feet or less height for evergreen trees) reduces the investment and risk of planting during drought periods, can establish a tree more quickly than planting a larger tree and will require less maintenance over time.
- Select from species that are hardy to the region and fit well with the Xeriscape principles of maintaining an attractive landscape with minimal water use.
- Proper mulching and adherence to watering guidelines for trees and shrubs will help establish newly planted trees in times of drought.

Planting Trees and Shrubs in Times of Drought and Water Restrictions Recommendations for Responsible Planting and Care

Frequently Asked Questions

Why should I plant trees and shrubs during times of drought and water restrictions?

Plant trees and shrubs during drought can be risky. Watering restrictions are in place and establishing trees in a semi-arid region is difficult enough without an extended drought to contend with. However, by eliminating all tree planting we will be missing many opportunities to keep our urban forest alive and vital in our region. It is critical to not only have a diverse set of species in the landscape but also a diversity of age among those species in the landscape. This means planting new and replacement trees each year, especially during times of drought, to replace trees and shrubs that will be lost to age, injury and other causes.

Plant with care and prudence during drought periods. Using smaller trees (2 inches or less caliper for deciduous trees and 6 feet or less height for evergreen trees) minimizes the investment risk and can also lead to earlier establishment and lower maintenance of the plantings over time. Carefully planting trees and shrubs will preserve the resources that are critical to maintain soil stability, reduce soil erosion, control and utilize storm water runoff, shade our moisture-starved lawns and reduce energy usage by shading homes in summer and blocking winds in winter. A well-stocked urban forest also acts as an air filter and purifier, absorbing carbon dioxide and emitting oxygen to help provide cleaner air.

Finally, planting trees and shrubs during drought periods will help increase the visibility of a diverse set of species that tolerate our environmental conditions in this region and fit well with Xeriscaping (low water use landscapes).

What are some other important factors to consider if I plant trees at this time?

Selection - if the landscape calls for planting trees, buy them 2 inches or less caliper for deciduous trees and 6 feet or less height for evergreen trees. Don't invest in large trees that may die because they can't be adequately watered. Smaller trees require less water to get them established.

Available space - both in terms of soil rooting area and airspace - a mature tree develops a root system that extends well beyond its branch extremities. A healthy mature tree has much more biomass in its root system than its above-ground leaves, branches and twigs. Big trees need large rooting areas. For example, a honeylocust planted in a narrow parking lot planting bed is essentially doomed to a short and stressful life. Trees that grow to be large should not be planted too close to other

trees, garden areas, buildings, sidewalks or to a property line, where they would encroach upon adjacent properties. Trees that grow to be large should not be planted under utility lines or within prescribed distances from them. Before planting in areas with underground utilities, contact the Utility Notification Center of Colorado at 1-800-922-1987.

Moisture - many tree species thrive where rainfall exceeds 30" annually. The Denver area receives 14-18" annually, so supplemental water is needed for many landscape trees. Humidity is very low in the Denver area; many species prefer higher relative humidity. On a smaller scale, the wetter, low-lying areas of a property can support different species than higher and drier spots.

Exposure - north-facing slopes are cooler, moister and retain snow longer than south-facing slopes; east-facing slopes are cooler and moister than west-facing slopes. Similarly, the north and east sides of a house are often more conducive to certain tree species than the west or south sides. For example, maples prefer cooler, moist soils - so they grow better on north or east exposures. The reflected heat and dryness of a south exposure is better suited for other species.

Light - most trees prefer full sunlight; many can tolerate partial shade. A few species known as "understory" trees are usually smaller trees that grow in the shade of larger trees in their native habitat. Note that some cultivars (horticultural selections) that have variegated leaves may "scorch" in the high-intensity sunlight of our mile-high area; these may fare better in partial shade or on east exposures.

Plant Grouping - Plants in the forest and other natural settings are often found in "communities" of like plants. There is strength in numbers. This concept is applicable to landscape gardening as well. Grouping plants with similar cultural requirements and water needs makes watering and maintenance easier. Plants in groups are generally more likely to thrive than individual plants sprinkled throughout the landscape.

What types of trees and shrubs should I plant?

Many plants are commercially available that may survive with extra care and attention, but are not necessarily well suited to a semi-arid climate. Plants appropriate to this climate will require less water, be less susceptible to pests and disease, and live longer than plants not suited to the semi-arid west. A list of regionally appropriate plants is provided below:

Xeric Plant List

BOTANIC NAME

COMMON NAME

Low Water Use Deciduous Trees

<i>Celtis occidentalis</i>	Hackberry
<i>Crataegus ambigua</i>	Russian Hawthorn
<i>Crataegus arnoldiana</i>	Arnold's Hawthorn
<i>Crataegus crus-galli</i>	Cockspur Hawthorn
<i>Crataegus crus-galli</i> var. <i>inermis</i>	Thornless Cockspur Hawthorn
<i>Crataegus crus-galli</i> var. <i>inermis</i> 'Crusader'	Crusader Thornless Hawthorn
<i>Crataegus douglasii</i>	River Hawthorn
<i>Crataegus mollis</i>	Downy Hawthorn
<i>Crataegus succulenta</i>	Fleshy Hawthorn
<i>Gymnocladus dioica</i>	Kentucky Coffeetree
<i>Juglans nigra</i>	Black Walnut
<i>Prunus americana</i>	American Plum
<i>Ptelea trifoliata</i>	Hoptree
<i>Pyrus calleryana</i> 'Aristocrat'	Aristocrat Pear
<i>Pyrus calleryana</i> 'Chanticleer'	Chanticleer Pear
<i>Pyrus calleryana</i> 'Stone Hill'	Stone Hill Pear
<i>Pyrus fauriei</i>	Fauriei Pear
<i>Pyrus fauriei</i> 'Korean Sun'	Korean Sun Pear
<i>Pyrus ussuriensis</i>	Ussurian Pear
<i>Pyrus ussuriensis</i> 'Prairie Gem'	Prairie Gem Pear
<i>Quercus gambelii</i>	Gambel Oak
<i>Quercus macrocarpa</i>	Bur Oak
<i>Quercus undulata</i>	Wavy Leaf Oak
<i>Robinia pseudoacacia</i> 'Globe'	Globe Locust
<i>Robinia pseudoacacia</i> 'Purple Robe'	Purple Robe Locust
<i>Xanthoceras sorbifolium</i>	Yellowhorn

Low Water Use Evergreen Trees & Shrubs

<i>Pinus aristata</i>	Bristlecone Pine
<i>Pinus cembroides</i> var. <i>edulis</i>	Pinyon Pine
<i>Pinus flexilis</i>	Limber Pine
<i>Pinus ponderosa</i>	Ponderosa Pine
<i>Juniperus</i> sp. (all upright and spreading cultivars)	Upright & Spreading Junipers

Low Water Use Deciduous Shrubs

<i>Amorpha canescens</i>	Great Plains Leadplant
<i>Amorpha fruticosa</i> var. <i>angustifolia</i>	Indigobush Leadplant
<i>Amorpha nana</i>	Dwarf Leadplant
<i>Artemisia cana</i>	Silver Sagebush
<i>Artemisia tridentata</i>	Tall Western Sagebush
<i>Atriplex canescens</i>	Four-Wing Saltbush
<i>Buddleia alternifolia</i> 'Argentea'	Alternate-Leaf Butterfly Bush
<i>Caragana arborescens</i>	Siberian Peashrub
<i>Caragana arborescens</i> 'Lobergii'	Fern-Leaf Siberian Peashrub
<i>Caragana frutex</i> 'Globosa'	Globe Peashrub
<i>Caragana maximowicziana</i>	Maximowicz Peashrub
<i>Caryopteris clandonensis</i> (all cultivars)	Blue Mist Spirea
<i>Ceanothus fendleri</i>	Mountain-Lilac
<i>Ceratoides lanata</i>	Winterfat
<i>Cercocarpus brevifolius</i>	Little Flowered Mountain-Mahogany
<i>Cercocarpus intricatus</i>	Littleleaf Mountain-Mahogany
<i>Cercocarpus ledifolius</i>	Curl-leaf Mountain-Mahogany
<i>Cercocarpus montanus</i>	Common Mountain-Mahogany
<i>Chamaebatiaria millefolium</i>	Fernbush
<i>Chrysothamnus</i> (all varieties)	Rabbitbrush
<i>Cowania mexicana</i>	Cliffrose
<i>Cytisus</i> 'Moonlight'	Moonlight Broom
<i>Cytisus purgans</i> 'Spanish Gold'	Andorra Broom
<i>Elaeagnus commutata</i>	Silverberry
<i>Elaeagnus umbellata</i>	Autumn-Olive
<i>Fallugia paradoxa</i>	Apache Plume
<i>Forestiera neomexicana</i>	New Mexican Privet
<i>Genista tinctoria</i> 'Royal Gold'	Royal Gold Woadwaxen
<i>Hypericum frondosum</i> 'Sunburst'	Sunburst St. Johnswort
<i>Hypericum</i> 'Hidcote'	Hidcote St. Johnswort
<i>Jamesia americana</i>	Waxflower
<i>Kolkwitzia amabilis</i>	Beautybush
<i>Ligustrum obtusifolium</i> var. <i>regelianum</i>	Regal Privet
<i>Ligustrum vulgare</i> 'Cheyenne'	Cheyenne Privet
<i>Ligustrum vulgare</i> 'Densiflorum'	Upright Privet
<i>Ligustrum vulgare</i> 'Lodense'	Lodense Privet
<i>Lonicera</i> 'Honeyrose'	Honeyrose Honeysuckle
<i>Lonicera korolkowii</i> var. <i>floribunda</i> 'Blue Velvet'	Blue Velvet Honeysuckle
<i>Lonicera syringantha</i> var. <i>wolfii</i>	Lilac-Flowering Dwarf Honeysuckle

<i>Lonicera tatarica</i> 'Arnold Red'	Arnold Red Honeysuckle
<i>Lonicera xylosteoides</i> 'Clavey's Dwarf'	Clavey's Dwarf Honeysuckle
<i>Lonicera xylosteoides</i> 'Miniglobe'	Miniglobe Honeysuckle
<i>Perovskia atriplicifolia</i>	Russian-Sage
<i>Philadelphus microphyllus</i>	Littleleaf Mockorange
<i>Prunus americana</i>	American Plum
<i>Prunus besseyi</i>	Western Sandcherry
<i>Prunus besseyi</i> 'Pawnee Buttes'	Pawnee Buttes Western Sandcherry
<i>Prunus tenella</i>	Dwarf Russian Almond
<i>Purshia tridentata</i>	Antelope Brush
<i>Quercus gambelii</i>	Gambel Oak
<i>Quercus undulata</i>	Wavy Leaf Oak
<i>Rhamnus smithii</i>	Smith's Buckthorn
<i>Rhus aromatica</i>	Fragrant Sumac
<i>Rhus aromatica</i> 'Gro-Low'	Gro-Low Sumac
<i>Rhus glabra</i>	Smooth Sumac
<i>Rhus glabra</i> var. <i>cismontana</i>	Rocky Mountain Sumac
<i>Rhus trilobata</i>	Threeleaf Sumac
<i>Rhus typhina</i>	Staghorn Sumac
<i>Rhus typhina</i> 'Laciniata'	Cutleaf Sumac
<i>Ribes aureum</i>	Golden Currant
<i>Ribes cereum</i>	Wax Currant
<i>Rosa woodsii</i>	Wood's Rose
<i>Shepherdia argentea</i>	Silver Buffaloberry
<i>Shepherdia canadensis</i>	Russet Buffaloberry
<i>Shepherdia rotundifolia</i>	Round-leaf Buffaloberry
<i>Syringa hyacinthiflora</i> (all cultivars)	Early Lilac (all cultivars)
<i>Syringa prestoniae</i> (all cultivars)	Late Lilac (all cultivars)
<i>Syringa vulgaris</i> (all cultivars)	Common & French Lilac (all cultivars)

BOTANIC NAME

COMMON NAME

Moderately Low Water Use Deciduous Trees

<i>Acer ginnala</i>	Amur Maple
<i>Acer ginnala</i> 'Flame'	Flame Amur Maple
<i>Acer grandidentatum</i>	Wasatch Maple
<i>Acer tataricum</i>	Tatarian Maple
<i>Aesculus glabra</i>	Ohio Buckeye
<i>Aesculus pavia</i>	Red Buckeye
<i>Aesculus hippocastanum</i>	Horsechestnut

Amelanchier 'Autumn Brilliance'	Autumn Brilliance Serviceberry
Amelanchier canadensis	Shadblow Serviceberry
Catalpa ovata	Chinese Catalpa
Catalpa speciosa	Western Catalpa
Cornus racemosa	Gray Dogwood
Crataegus phaenopyrum	Washington Hawthorn
Crataegus virdis 'Winter King'	Winter King Hawthorn
Fraxinus americana 'Empire'	Empire Ash
Fraxinus mandschurica 'Mancana'	Mancana Ash
Fraxinus nigra 'Fall Gold'	Fall Gold Ash
Fraxinus pennsylvanica	All Green Ash Cultivars
Gleditsia triacanthos 'Imperial'	Imperial Honeylocust
Gleditsia triacanthos 'Shademaster'	Shademaster Honeylocust
Gleditsia triacanthos 'Skyline'	Skyline Honeylocust
Gleditsia triacanthos 'Sunburst'	Sunburst Honeylocust
Koelreuteria paniculata	Golden Raintree
Malus spp. (including all Crabapples and Apples)	Apples & Crabapples (all types)
Phellodendron amurense	Amur Corktree
Prunus virginiana	Native Chokecherry
Prunus virginiana 'Schubert'	Canada Red Chokecherry
Prunus padus	Mayday Tree
Quercus alba	White Oak
Quercus bicolor	Swamp White Oak
Quercus imbricaria	Shingle/Laurel Oak
Quercus prinus	Chestnut Oak
Quercus robur	English Oak
Quercus robur 'Fastigiata'	Columnar English Oak
Robinia pseudoacacia 'Frisia'	Frisia Black Locust
Sophora japonica	Japanese Pagoda Tree
Syringa pekinensis	Peking Lilac
Syringa reticulata	Japanese Tree Lilac

Moderately Low Water Use Evergreen Trees

Pinus nigra	Austrian Pine
Pinus strobiformis	Southwestern White Pine
Pinus sylvestris	Scotch Pine

Moderately Low Water Use Deciduous Shrubs

Acer ginnala	Amur Maple
Acer ginnala ' Bailey Compact'	Bailey Compact Amur Maple
Acer ginnala ' Compactum'	Compact Amur Maple
Acer ginnala ' Emerald Elf'	Emerald Elf Amur Maple
Acer ginnala 'Flame'	Flame Amur Maple
Acer tataricum	Tatarian Maple
Amelanchier alnifolia	Saskatoon Serviceberry
Amelanchier alnifolia 'Regent'	Regent Serviceberry
Amelanchier 'Autumn Brilliance'	Autumn Brilliance Serviceberry
Amelanchier canadensis	Shadblow Serviceberry
Berberis mentorensis	Mentor Barberry
Berberis thunbergii 'Atropurpurea'	Red Leaf Barberry
Berberis thunbergii ' Bagatelle'	Bagatelle Barberry
Berberis thunbergii 'Crimson Pygmy'	Crimson Pygmy Barberry
Berberis thunbergii 'Rose Glow'	Rose Glow Barberry
Buddleia davidii cultivars	Butterfly Bush
Chaenomeles spp.	Flowering Quince
Cotoneaster apiculatus	Cranberry Cotoneaster
Cotoneaster apiculatus 'Tom Thumb'	Tom Thumb Cotoneaster
Cotoneaster dammeri 'Coral Beauty'	Coral Beauty Cotoneaster
Cotoneaster divaricatus	Spreading Cotoneaster
Cotoneaster horizontalis	Rock Cotoneaster
Cotoneaster horizontalis perpusillus	Ground Cotoneaster
Cotoneaster lucidus	Hedge Cotoneaster
Cotoneaster acutifolia	Peking Cotoneaster
Holodiscus dumosus	Rock Spirea
Lonicera involucrata	Twinberry Honeysuckle
Philadelphus lewisii	Lewis Mockorange
Physocarpus monogynus	Mountain Ninebark
Physocarpus opulifolius & cultivars	Ninebark
Potentilla fruticosa cultivars	Potentilla
Prunus fruticosa	Ground Cherry
Prunus tomentosa	Nanking Cherry
Prunus virginiana	Native Chokecherry
Prunus virginiana 'Schubert'	Canada Red Chokecherry
Rhamnus frangula 'Asplenifolia'	Fern-Leaf Buckthorn
Rhamnus frangula 'Columnaris'	Columnar Buckthorn
Ribes alpinum	Alpine Currant
Ribes alpinum ' Green Mound'	Green Mound Currant

Ribes 'Red Lake'	Red Lake Currant
Ribes 'Pixwell'	Pixwell Gooseberry
Ribes uva crisper 'Red Jacket'	Red Jacket Gooseberry
Rosa (All Shrub Roses)	Shrub Rose
Sibiraea laevigata	Siberian Spirea
Sorbaria sorbifolia	Ash-Leaf False Spirea
Symphoricarpos albus	White Snowberry
Symphoricarpos chenaultii 'Hancock'	Hancock Coralberry
Symphoricarpos doorenbosii 'Magic Berry'	Magic Berry Coralberry
Symphoricarpos doorenbosii 'White Hedge'	White Hedge Snowberry
Symphoricarpos occidentalis	Western Snowberry
Symphoricarpos orbiculatus	Red Coralberry
Symphoricarpos oreophilus	Mountain Snowberry
Syringa chinensis	Chinese Lilac
Syringa patula 'Miss Kim'	Miss Kim Lilac
Syringa villosa	Late Lilac
Viburnum lantana	Wayfaringtree Viburnum
Viburnum lantana 'Mohican'	Mohican Viburnum
Viburnum lentago	Nannyberry Viburnum
Viburnum rhytidophyloides 'Alleghany'	Alleghany Leatherleaf Viburnum

What are Xeric Plants and the principles of Xeriscaping?

Development of new themes in landscaping using dryland or xeric principles is radically different from the traditional approach to landscaping as it has been commonly practiced in the Front Range area. The Front Range is semi-arid, and we are just coming to grips with just how semi-arid it is. Xeric plants are low to moderately low water use plants in the landscape. Be aware that even low water use plants must be watered well in order to become established. Once established, xeric plant materials need much less water and maintenance than plants not suited to semi-arid conditions.

The traditional approach using vast swaths of bluegrass lawn in conjunction with small and peripheral shrub and perennials beds along the edges needs to be rethought. A more practical solution will reduce water usage dramatically and will retain an attractive and vibrant landscape. One goal of revising our landscape water needs is to save existing trees and shrubs, plants that have been in the Denver landscape for years. Dryland landscape schemes provide the homeowner with options that can be used to create a landscape that is water wise from the beginning and offers an attractive alternative to expansive areas of lawn.

How can Xeriscaping principles keep a landscape attractive and water efficient?

The following are suggestions on how to keep a landscape attractive and water efficient.

Shrub Beds - enlarging beds under trees to the edge of their drip lines, extending shrub and perennial beds outward from along the edge of the house reduces the amount of bluegrass lawn as a percentage of the overall landscape.

Soil Amendments – prepare tree and shrub beds by adding compost to the soil. This improves soil texture and adds essential nutrients that plants use. Adding organic matter to the soil helps it retain moisture as well.

Irrigation Systems - redesign sprinkler systems to achieve an efficient irrigation system. Drip irrigation systems apply water directly to the soil and are very efficient.

Plant Selection - install dryland plants in the tree and shrub beds. There are many attractive and colorful perennials and versatile groundcovers that are low water users in addition to the trees and shrubs listed above. Grouping plants with similar cultural requirements and water needs makes watering and maintenance easier.

What else can be done to make my landscape more water efficient?

Using an organic mulch such as wood chips, bark, leaves and evergreen needles around trees and in shrub beds will provide several benefits. A four inch layer of mulch under trees and around shrubs and perennials goes a long way to keep plants alive and healthy. Mulch helps to regulate soil temperature resulting in less stress on plants between hot, dry summer days and freezing winter nights. Mulch allows for less and easier weeding of beds. Organic mulches, as they gradually break down, add nutrients to the soil. Mulching around the base of trees also keeps the lawn mower and weed eater from damaging the bark of trees.

Most importantly, mulching reduces water usage. A mulched area under low-water-use trees with dryland shrubs or perennials can reduce water usage *by as much as 50 percent* from the water needed to maintain a bluegrass lawn.

Mulching mature trees to their drip line is beneficial as well. For a larger-sized tree this may extend a mulch circle outward from the trunk 20 feet or more, greatly reducing the amount of lawn. Having mulch to that point helps retain moisture in the root area.

SHRUB WATERING RECOMMENDATIONS

Q. How much water do shrubs require?

A. Newly planted shrubs require more water than established shrubs that have been planted for at least one year. The following recommendations assume shrubs are mulched to retain moisture (see mulching under Caring for trees FAQ for more information). During the first growing season, a small sized shrub transplanted from a one gallon container will require 4 to 6 gallons per week. Once established, small shrubs will grow well on 2 gallons per week. Larger shrubs may need as much as 10 gallons per week. True low water use shrubs may require less water than this. See the Planting trees and shrubs FAQ for a list of low water use shrubs.

In dry winters, all shrubs will benefit from winter watering from October through March. Apply 5 gallons two times per month for a newly planted shrub. Small established shrubs (less than 3 feet tall) should receive 5 gallons monthly. Large established shrubs (more than 6 feet) will require 18 gallons on a monthly basis. Decrease amounts to account for precipitation. Water within the dripline of the shrub and around the base.